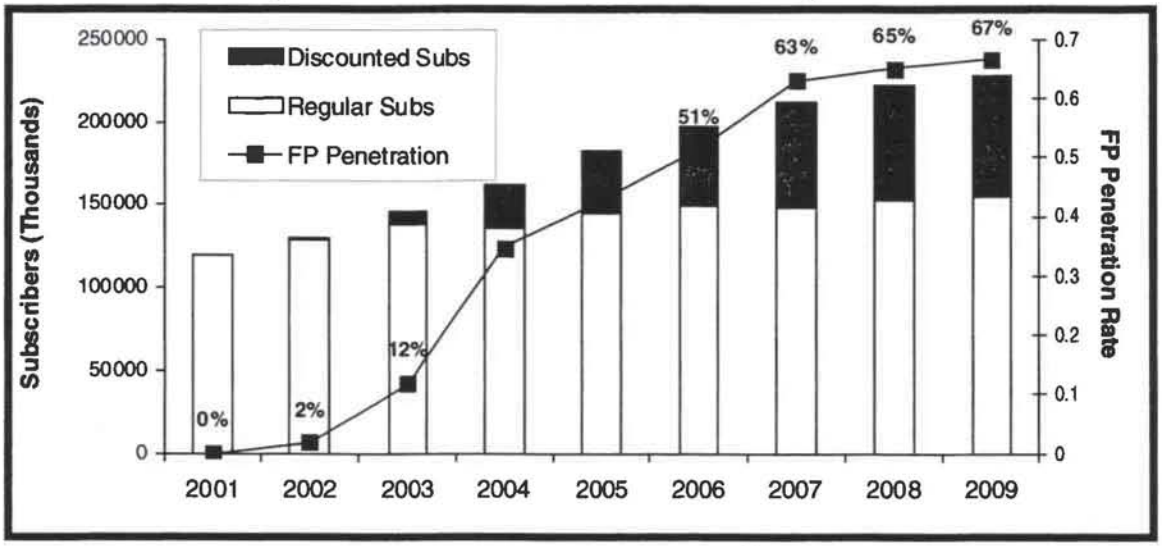
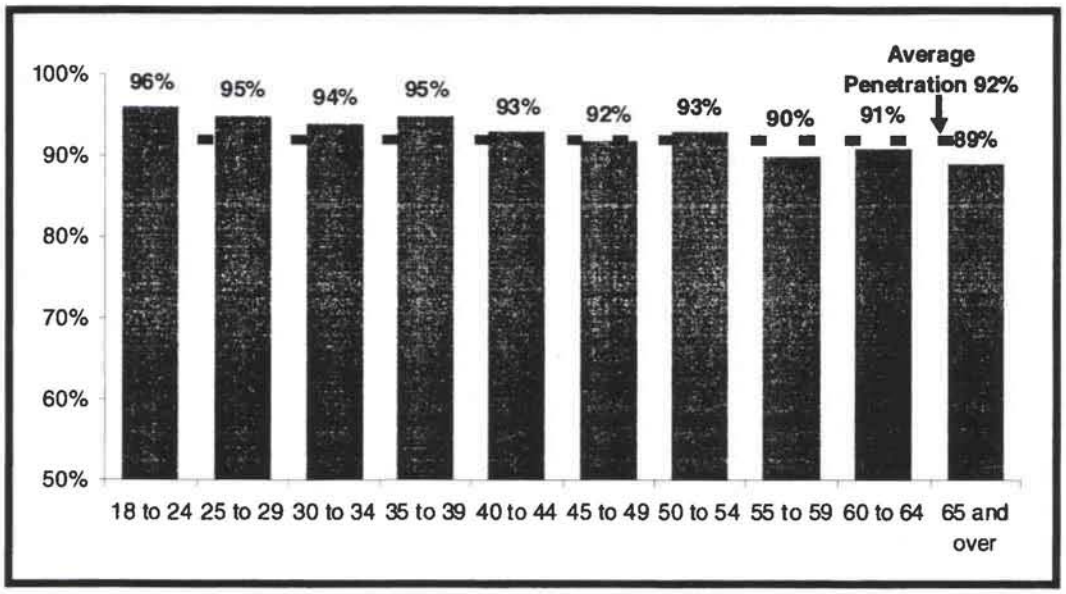
Chart 12
Family Plan Subscribers and Penetration of Postpaid Base[515]



4. Mobile Wireless Subscribers by Age

168. In April 2009, Morgan Stanley estimated mobile wireless subscribership by age group (see Chart 13). While penetration rates are high at nearly every age group, they are highest among 18- to 24-year-olds, where penetration has reached 96 percent. The only age group with a penetration rate less than 90 percent is the 65 and over age range, where penetration is 89 percent.

Chart 13
Mobile Wireless Penetration by Age[516]

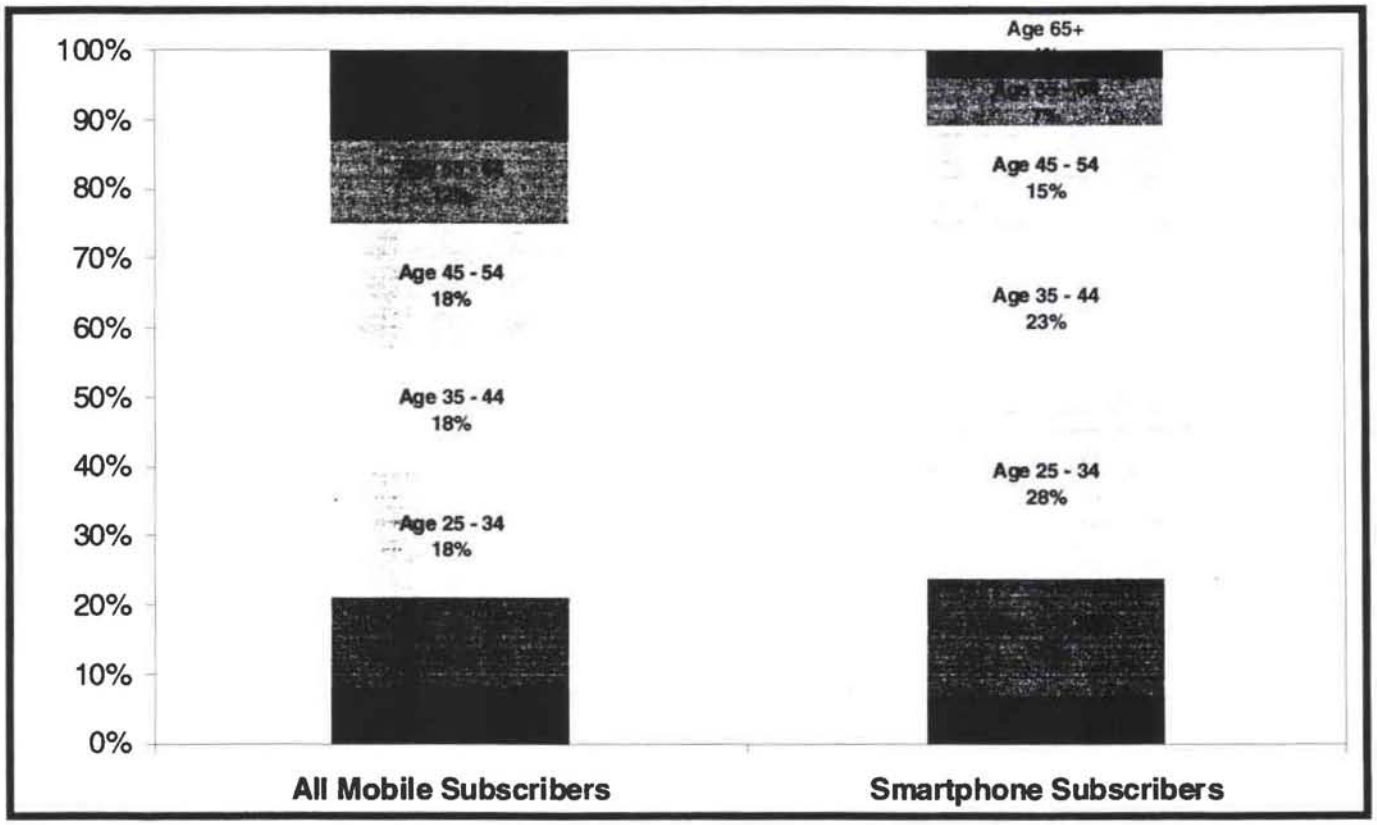


[515] Data provided by Credit Suisse First Boston.

[516] Simon Flannery , et al., *1Q Wireless Survey: Verizon, AT&T & Unlimited Prepaid Carriers Show Strength*, Morgan Stanley, Apr. 12, 2009, at 18 (Exhibit 28).

169. In addition, comScore has estimated the demographic age breakdown of all mobile wireless subscribers and of smartphone subscribers, as shown in Chart 14 below. While the adoption of all mobile wireless devices is fairly evenly distributed among various age groups, smartphones are more concentrated in younger age groups. Chart 14 shows that adults age 18-44 comprise 49 percent of all mobile wireless subscribers, but make up 68 percent of smartphone users. On the other hand, adults over age 55 comprise 25 percent of all mobile wireless subscribers but only 11 percent of smartphone subscribers.

Chart 14
Age Breakdown of Mobile Wireless Subscribers[517]



170. Pew also provides data on wireless Internet use among different age groups and found that, as of May 2010, 18-to-29-year-olds had the highest penetration rate of any age group in overall wireless Internet use (Wi-Fi or mobile broadband connection) and in the various device categories – laptop, cell phone, or both, as shown in Table 15.[518] It was most common for adults age 18-49 to access the Internet wirelessly using both a laptop and a cell phone. However, among older adults over age 50, the most common method was with a laptop only. In addition, Pew found that wireless Internet penetration increased across all age groups between April 2009 and May 2010 (see Chart 15).

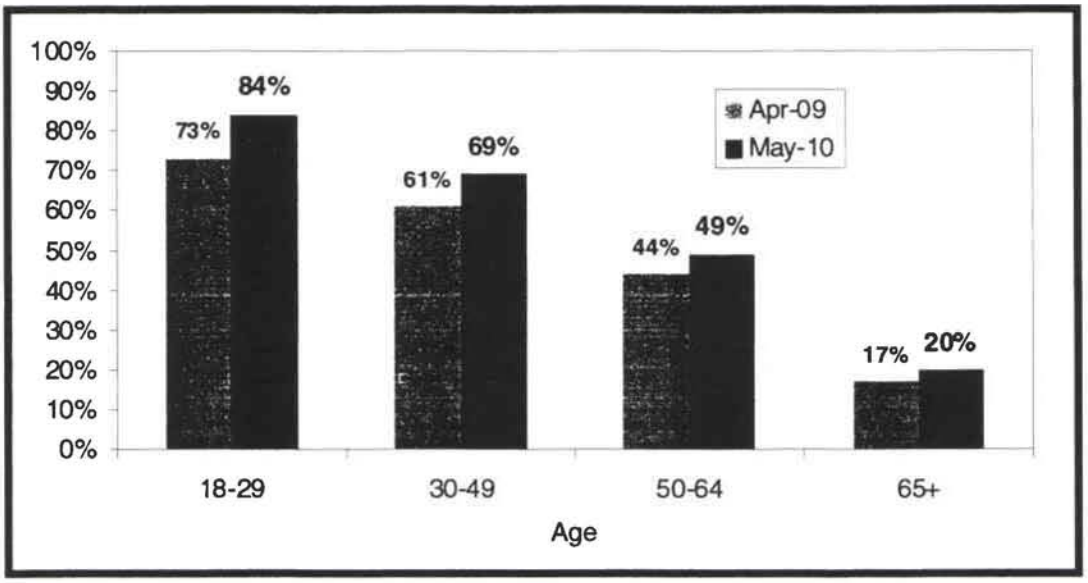
[517] The data are based on a three-month average ending September 2010. *See Age Demographic Breakdown of U.S. Mobile Subscribers vs. Smartphone Subscribers*, comScore, The comScore Data Mine, Nov. 1, 2010.

[518] *Mobile Access 2010*, at 11.

Table 15
Wireless Internet Use by Age and Type of Device[519]

Age	Wireless Internet Penetration Rate	Laptop and Cell Phone	Laptop Only	Cell Phone Only
18-29	84%	45%	19%	19%
30-49	69%	35%	22%	13%
50-64	49%	17%	23%	9%
65+	20%	6%	9%	5%

Chart 15
Percent of Adults Using Wireless Internet Connections (Wi-Fi or Mobile)[520]



171. Pew also provides data on mobile wireless service adoption rates among teenagers. As discussed in the *Fourteenth Report*, Pew found that, as of September 2009, 75 percent of teens age 12 to 17 subscribed to mobile wireless service, and that subscribership levels increased as teens grew older.[521] In a more recent study, Pew provided more in-depth data on mobile wireless usage and adoption rates among teens.[522] Pew reported that a higher percentage of teens use text messaging (54 percent) than use mobile voice calling services (38 percent), and that the adoption rates for both services generally increase with age (see Table 16).[523]

[519] Wireless Internet users include those connecting to the Internet via a Wi-Fi or 3G/4G mobile broadband network. Aaron Smith, *Mobile Access 2010*, Pew Internet & American Life Project, July 7, 2009 (survey conducted April 29 – May 20, 2010), at 11.

[520] *Id.*

[521] *See Fourteenth Report*, 25 FCC Rcd at 11515-16, ¶ 166.

[522] Amanda Lenhart, *et al.*, *Teens and Mobile Phones*, Pew Internet and American Life Project, April 2010, (*Teens and Mobile Phones*), http://www.pewinternet.org/Reports/2010/Teens-and-Mobile-Phones.aspx?r=1 (report based on survey results and focus group feedback from June through October 2009).

[523] *Teens and Mobile Phones*, at 4.

Table 16
Mobile Wireless Voice and Texting Penetration among Teenagers[524]

Age	Text Messaging	Mobile Voice Calling
12	35%	17%
13	41%	29%
14	58%	42%
15	64%	41%
16	57%	51%
17	77%	60%
Teen Average	***54%***	***38%***

172. As discussed in the *Fourteenth Report*, one marketing analyst reported in December 2009 that the adoption rates of mobile data services, such as web browsing, e-mail, and applications, are higher in the 18-to-24 and 25-to-44 age groups than among older users.[525] In addition, as shown in Table 17 below, the smartphone ownership and text messaging adoption rates are higher among younger age groups.[526]

Table 17
Smartphone and SMS Adoption by Age Group[527]

Age Range	Smartphone Ownership Rate	SMS Adoption Rate
18 to 24 year-olds	29%	83%
25 to 44 year-olds	29%	65%
45 to 54 year-olds	24%	52%
55 to 64 year-olds	13%	33%

5. Mobile Wireless Connections by Economic Area (EA)

173. To analyze mobile wireless connections across geographic areas, we have estimated mobile wireless connections per 100 people (penetration rates) in the EAs of the United States using NRUF data on mobile devices with phone numbers assigned to them.[528] As discussed above, we use EAs as the geographic unit for measuring the level of concentration in the mobile wireless services industry in

[524] *Teens and Mobile Phones*, at 4.

[525] Marketing Sherpa, *Consumer Behavior in the Mobile Channel: 4 Trends Marketers Should Note,* Dec. 22, 2009, *available at* https://www.marketingsherpa.com/sample.cfm?ident=31481.

[526] *Id.*

[527] *Id.*

[528] NRUF data are collected on a small area basis and thus allows the Commission to compare the spread of mobile wireless subscribership across different areas within the United States. NRUF data are collected by the area code and prefix (NXX) level for each provider, which enables the Commission to approximate the number of subscribers that each provider has in each of the approximately 18,000 rate centers in the country. Rate center boundaries generally do not coincide with county boundaries. However, for purposes of geographical analysis, rate centers (including those that cross county boundaries) can be associated with the county that contains the (usually) centralized geographic point for that rate center. Counties, for which population and other data exist, can be aggregated together and associated with several larger geographic areas based on counties, such as EAs and Cellular Market Areas (CMAs). Aggregation to larger geographic areas reduces the level of inaccuracy inherent in combining non-coterminous areas such as rate center areas and counties.

order to maintain continuity with past *Reports*[529] and ensure that we do not compromise the confidential information found in the NRUF data.[530]

174. Regional penetration rates for the 172 EAs covering all 50 states, as of December 2009, can be seen in Appendix C, Table C-3. In addition, a map showing regional penetration rates by EAs can be found in Appendix D.[531] Eighteen EAs had penetration rates exceeding 100 percent, up from eight at the end of 2008, which could be the result of subscribers having more than one device, as well as traditional prepaid customers switching to a new device without terminating service on the old one and therefore maintaining two phone numbers.[532] In 83 EAs, the penetration rates exceeded 90 percent, up from 53 EAs at the end of 2008. The EA with the lowest reported penetration rate was Sacramento-Yolo, CA (EA 164), with a penetration rate of 71 percent.[533] The EA with the lowest population density, Anchorage, AK (EA 171), had a penetration rate of 90 percent, while the EA with the highest density, Tampa-St. Petersburg-Clearwater, FL (EA 34), had a penetration rate of 95 percent. As previously stated, based on an analysis of NRUF data, the national penetration rate at the end of 2009 was 94 percent.

B. Net Adds

1. Industry-Wide Net Adds

175. As discussed in the *Fourteenth Report*, as the wireless industry has reached penetration levels exceeding 90 percent of the U.S. population, the growth of net new mobile wireless connections

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[529] There are 172 EAs, each of which is an aggregation of counties. Each EA is made up of one or more economic nodes and the surrounding areas that are economically related to the node. The main factor used in determining the economic relationship between the two areas is commuting patterns, so that each EA includes, as far as possible, the place of work and the place of residence of its labor force. *See* Kenneth P. Johnson, *Redefinition of the EA Economic Areas*, Survey Of Current Business, Feb. 1995, at 75 (*Redefinition of the EA*). For its spectrum auctions, the Commission has defined four additional EAs: Guam and the Northern Mariana Islands (173); Puerto Rico and the U.S. Virgin Islands (174); American Samoa (175); and Gulf of Mexico (176). *See* FCC, *FCC Auctions: Maps, available at* http://wireless.fcc.gov/auctions/data/maps.html (visited Dec. 15, 2008). In November 2004, the Bureau of Economic Analysis released updated definitions of EAs; however, for consistency, we use the previous release of definitions. *See New BEA Economic Areas For 2004*, Bureau of Economic Analysis, Nov. 17, 2004. As noted above, the Commission typically has used smaller geographic areas, such as CMAs, for analyzing mobile wireless transactions. *See, e.g., Sprint Nextel-Clearwire Order*, 23 FCC Rcd at 17591, ¶¶ 51-52; *Verizon Wireless-Alltel Order*, 23 FCC Rcd at 17472-73, ¶ 52.

[530] Wireless providers have considerable discretion in how they assign telephone numbers across the rate centers in their operating areas and, according to one analyst, assign numbers so as to minimize the access charges paid to local wireline companies. *See* Linda Mutschler *et al.*, *Wireless Number Portability*, Merrill Lynch, Equity Research, Jan 9, 2003, at 8 ("For wireless operators, the standard practice is to aggregate phone numbers within the same area code onto the same or several rate centers, whose physical locations would result in the least amount of access charges paid to ILECs. Therefore, in each market, wireless operators are present in only a small number of rate centers. According to our industry sources, this percentage is probably below 20%, and could be meaningfully lower than 20%"). Therefore, a mobile wireless subscriber can be assigned a phone number associated with a rate center that is a significant distance away from the subscriber's place of residence or usage, but generally still in the same EA. *See* Linda Mutschler, *et al.*, *US Wireless Services: Wireless Number Portability – Breaking Rules*, Merrill Lynch, Equity Research, Feb. 28, 2003, at 3 ("Once the NPA-NXX (*i.e.*, 212-449) is assigned to the wireless carrier, the carrier may select any one of its NPA-NXXs when allocating that number to a particular subscriber. Therefore, with regard to wireless, the subscriber's physical location is not necessarily a requirement in determining the phone number assignment – which is very different from how wireline numbers are assigned").

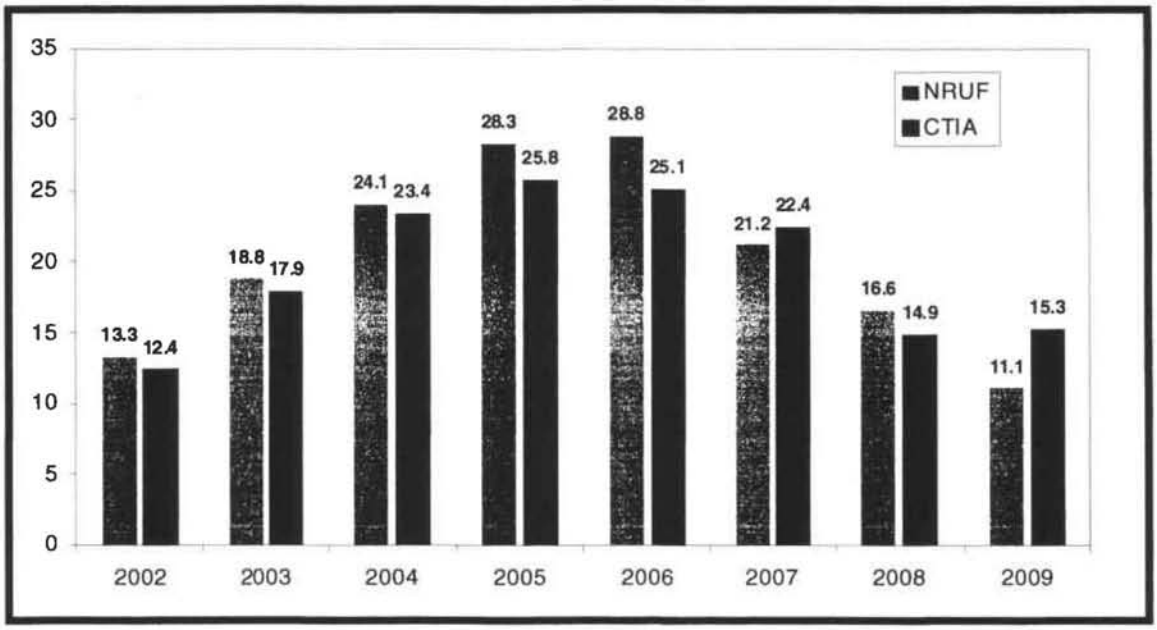
[531] *See* Map D-30, Appendix D, *infra*.

[532] We excluded New Orleans, LA-MS (EA 83) from this analysis due to what we believe to be an aberration with the statistics. See Appendix C, Table C-3: Economic Area Penetration Rates, note 1 infra.

[533] In seven EAs, the penetration rate could not be reported for confidentiality reasons because the number of competing providers in the EA is less than four.

has decelerated in recent years. During 2009, the number of new connections, based on NRUF data, grew four percent, down from the 6.3 percent growth rate in 2008. The total number of net adds in 2009 was 11.1 million according to NRUF data and 15.3 million according to CTIA data (see Chart 16).

Chart 16
Total Mobile Wireless Connection Annual Net Adds[534]



176. Net adds in 2009 were largely the result of subscribers purchasing a second or third mobile wireless device, such as a laptop card or e-reader, as well as new subscribers, particularly those in younger age groups, purchasing mobile wireless service for the first time.[535] As discussed above, penetration rates among teens and young adults are significantly higher than among adults over age 65.[536] In addition, the number of mobile broadband-enabled laptops and laptop cards increased by 4.7 million during 2009. As shown in Chart 17, a large portion of the net adds in 2009 occurred during the fourth quarter, when net adds totaled 5.7 million, an amount significantly higher than the 2008-2009 quarterly average of 3.8 million. During that quarter, e-readers such as the Amazon.com Kindle and Barnes & Noble Nook were popular holiday gifts. Leap launched mobile broadband service in several new markets and at a lower price than many of its rivals, and introduced several new smartphones.[537]

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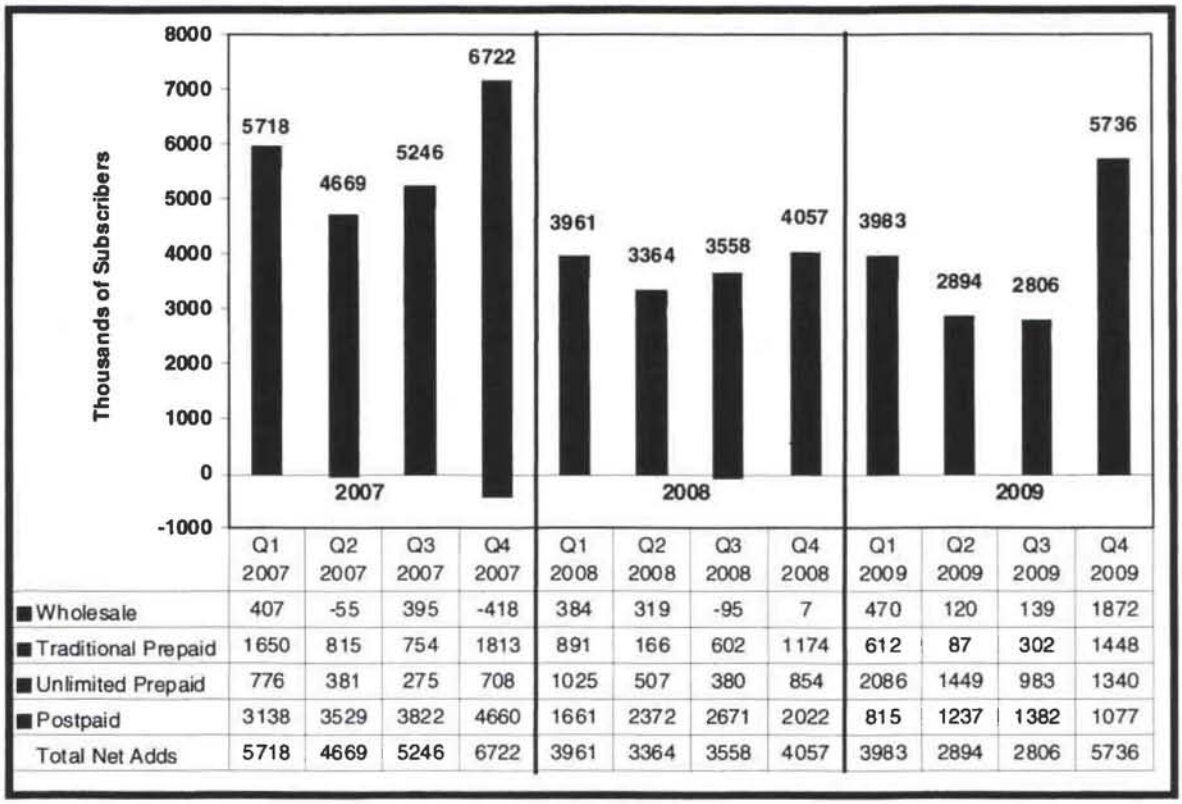
[534] *See* Table 14, *supra*.

[535] As discussed above, the NRUF data used to generate an estimate of mobile wireless subscribers are based on the number of phone numbers assigned to mobile wireless devices. Therefore, any device with a mobile wireless phone number is counted as a subscriber, and many data-only devices with mobile wireless network connections, such as laptop cards and e-readers, have phone numbers assigned to them. *See* Section V.A.1, Total Mobile Wireless Connections, *supra*.

[536] *See* Section V.A.4, Mobile Wireless Subscribers by Age, *supra*.

[537] *See* Sections IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, IV.B.1.a, Service Provider Technology Deployments, and, IV.B.3, Differentiation in Mobile Wireless Handsets/Devices, *supra*. According to Bernstein, "[l]aptop cards ... have proliferated, with low cost plans from both Leap Wireless and Clearwire that have begun to take 3G laptop connectivity into the mainstream consumer market for the first time." *See* Craig Moffett, *et al., U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, Bernstein Research, June 14, 2010, at 7.

Chart 17
Quarterly Net Adds by Pricing Plan: 2007-2009[538]



	Q1 2007	Q2 2007	Q3 2007	Q4 2007	Q1 2008	Q2 2008	Q3 2008	Q4 2008	Q1 2009	Q2 2009	Q3 2009	Q4 2009
Wholesale	407	-55	395	-418	384	319	-95	7	470	120	139	1872
Traditional Prepaid	1650	815	754	1813	891	166	602	1174	612	87	302	1448
Unlimited Prepaid	776	381	275	708	1025	507	380	854	2086	1449	983	1340
Postpaid	3138	3529	3822	4660	1661	2372	2671	2022	815	1237	1382	1077
Total Net Adds	5718	4669	5246	6722	3961	3364	3558	4057	3983	2894	2806	5736

2. Mobile Wireless Net Adds by Pricing Plan

177. Examining net adds by pricing plan also provides insight into the type of subscriptions that contributed to the growth in mobile wireless connections in 2009. As shown in Chart 17 above, net adds have varied by type of pricing plan over the past two years.[539] The number of postpaid subscribers continued to grow during 2009, but at a slower rate than in 2008. According to UBS, there were 4.5 million postpaid net adds (29 percent of total net adds) in 2009, down from 8.7 million (58 percent of total net adds) in 2008. The number of unlimited prepaid net adds, on the other hand, grew significantly during 2009, from 2.8 million (19 percent of total net adds) in 2008 to 5.9 million (38 percent of total net adds) in 2009. This trend may continue to be a reflection of the lower prices and increased number of offerings for prepaid plans, as discussed above, and of the economic recession, which may have led consumers to seek lower-priced, higher-value mobile wireless service with no long-term contracts.[540]

178. The number of wholesale net adds (excluding TracFone) also grew during 2009, increasing from 615,000 in 2008 to 2.6 million in 2009.[541] Wholesale subscribers accounted for 17 percent of total net adds in 2009, up from four percent in 2008. The increase in the number of wholesale subscribers may reflect the growing number of subscribers who purchased Clearwire's WiMAX service

[538] *US Wireless 411 2Q10*, at 4. Wholesale excludes TracFone.

[539] Note that the postpaid, unlimited prepaid, and wholesale categories can include subscriptions to voice-only, data-only, and voice-data services.

[540] *See* Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra*.

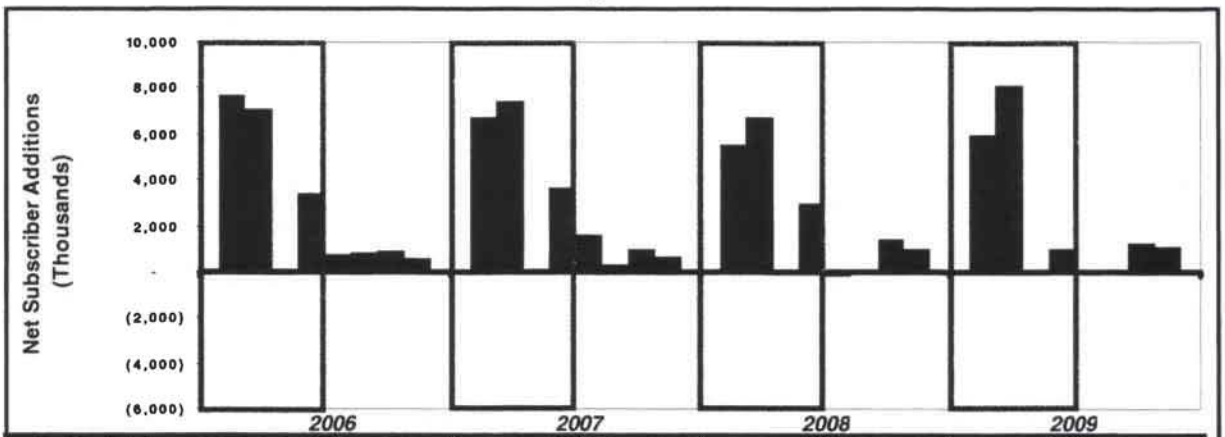
[541] *See* Section V.A.3, Mobile Wireless Subscribers by Pricing Plan, *supra*, for a discussion of the reasons for the increasing number of wholesale subscribers.

on a wholesale basis from another provider,[542] as well as the growing use of data-only devices, such as e-readers, that use mobile data service on a wholesale basis. For instance, UBS estimates that the number of wholesale subscribers grew more than 34 percent during the fourth quarter of 2009 alone, the same period during which Amazon.com and Barnes & Noble were heavily promoting their respective Kindle and Nook e-reader devices for the holiday season.[543]

3. Mobile Wireless Net Adds by Service Provider

179. As discussed in the *Fourteenth Report* and shown in Chart 18 below, net subscriber additions were not been evenly distributed across all service providers. During 2009, AT&T and Verizon Wireless gained 8.1 million and 6 million net adds, respectively, while T-Mobile had just over 1 million net adds and Sprint Nextel had a 205,000 net subscriber loss. MetroPCS and Leap, while smaller than the top four providers, increased their subscriber bases by about 24 and 29 percent, respectively during 2009.

Chart 18
Net Additions by Service Provider[544]



	2006	2007	2008	2009
Verizon Wireless	7,715	6,740	5,558	5,974
AT&T	7,114	7,423	6,785	8,111
Sprint Nextel	3,894	830	(4,667)	(205)
T-Mobile	3,442	3,657	2,973	1,032
Alltel	722	1,576	(181)	
US Cellular	870	307	74	(55)
MetroPCS	941	1,022	1,404	1,273
Leap Wireless	561	635	981	1,109

* Includes wholesale subscribers. *Pro-forma* calculations were made to account for mergers and show only "organic" net adds generated independent of mergers. For instance, Verizon Wireless's reported net additions for 2009, including the subscribers acquired from Alltel, totaled 19,193,000.

[542] Companies reselling Clearwire's WiMAX service include Comcast, Bright House Networks, and Best Buy. *See* Sections III.E.1, Entry and IV.B.1.a, Service Provider Technology Deployments, *supra.*

[543] *US Wireless 411 2Q10*, at 4. Wholesale subscribers exclude TracFone.

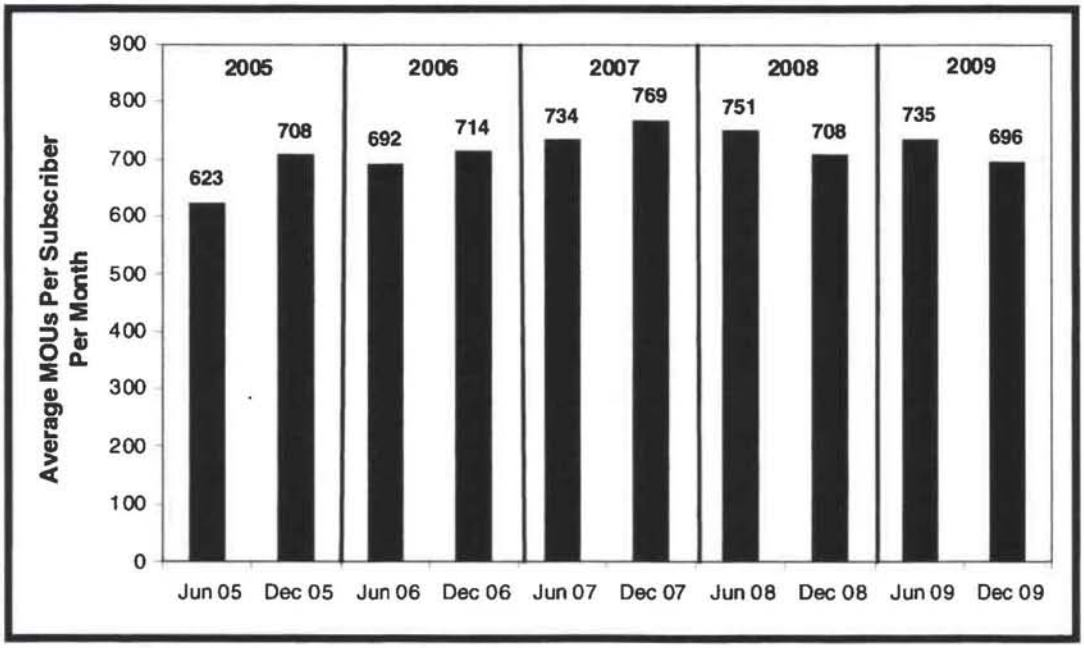
[544] *See Fourteenth Report*, 25 FCC Rcd at 11521, Chart 20, 11648, Table C-4; *Thirteenth Report*, 24 FCC Rcd at 6320-21, Table A-4 (2006 subscriber data); *Twelfth Report*, 23 FCC Rcd at 2361-62, Table A-4 (2005 subscriber data). This research includes wholesale subscribers. *Pro-forma* calculations were made to account for mergers and show only "organic" net adds generated independent of mergers. Verizon Wireless's reported net additions for 2009, including the subscribers acquired from Alltel, totaled 19,193,000. Verizon Communications, Inc., SEC Form 10-K (Portions of Verizon Annual Report to Shareholders), filed Feb. 26, 2010, *available at* http://www.sec.gov/Archives/edgar/data/732712/000119312510041685/dex13.htm.

C. Output and Usage Levels

1. Mobile Voice

180. As a measure of mobile voice usage, CTIA reports the average MOUs for six-month periods.[545] As shown in Chart 19 below, MOUs continued to decline in 2009, from 708 for the second half of 2008 to 696 during the second half of 2009. When comparing the first half of 2008 with the first half of 2009, MOUs declined two percent from 751 to 735. The trend of declining voice minutes may be due to substitution by mobile messaging and other mobile data services, particularly among younger users.[546] A study by Nielsen found that average MOUs fell five percent between 2009 and 2010, and that the decline was 17 percent among 18- to 24-year-olds.[547]

Chart 19
Average MOUs Per Subscriber Per Month[548]



181. Chart 20 below shows that, while T-Mobile's MOU levels have been consistently higher than those of the other three nationwide providers over the past several quarters, the average MOUs of all four nationwide service providers declined during 2009.

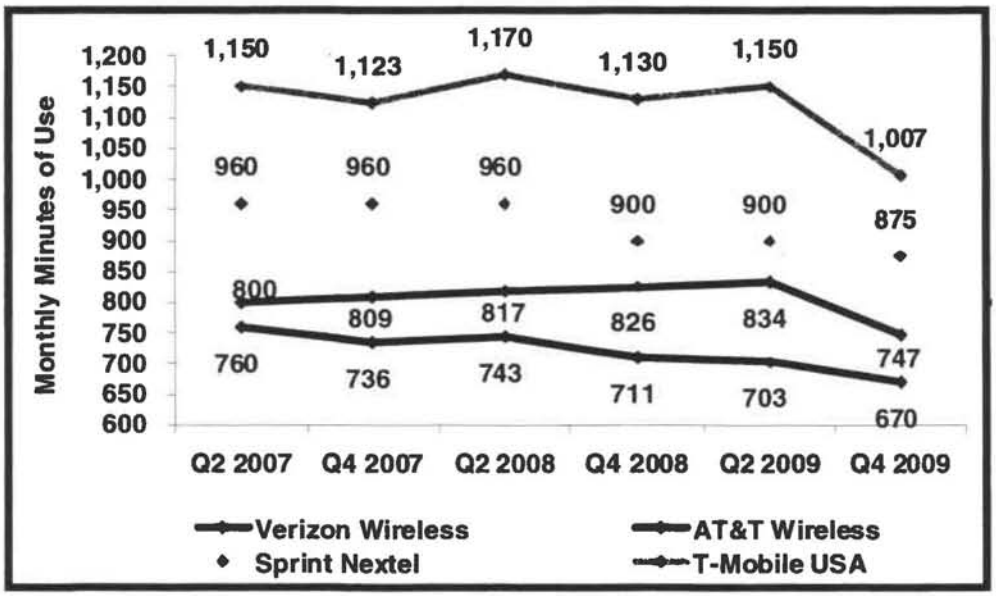
[545] CTIA aggregates all of the service providers' MOUs from January 1 through June 30, or from July 1 through December 31, then divides by the average number of subscribers for the period, and then divides by six. *See Thirteenth Report*, 24 FCC Rcd at 6284, note 582.

[546] *See* Katherine Rosman, *Y U Luv Texts, H8 Calls*, The Wall Street Journal, Oct. 14, 2010; *Fourteenth Report*, 25 FCC Rcd at 11521, ¶ 176. Mobile messaging traffic is discussed in Section V.C.2, Mobile Messaging, *infra.*

[547] *See* Katherine Rosman, *Y U Luv Texts, H8 Calls*, The Wall Street Journal, Oct. 14, 2010.

[548] *CTIA Year-End 2009 Wireless Indices Report*, at 200-201.

Chart 20
MOUs Per Subscriber: Four Nationwide Service Providers[549]



2. Mobile Messaging

182. Mobile text messaging traffic continued to grow in 2009, though at a slower rate than in 2008. According to data reported by CTIA, text messaging volumes grew from a total of 1 trillion in 2008 to 1.6 trillion in 2009 (see in Chart 21).[550] This represents a growth rate of 56 percent, which is lower than the 177 percent growth rate seen in 2008. Mobile wireless subscribers sent significantly more photo, video, and other multimedia messages (MMS) with their devices during 2009. As shown in Chart 22 below, CTIA reports that a total of 34.5 billion MMS messages were sent during 2009, a 131 percent increase from the 14.9 billion sent during 2008.[551] Over 70 percent of the total MMS messages sent during 2009 were sent during the second half of the year.

[549] *US Wireless 411 2Q09.*

[550] *CTIA Year-End 2009 Wireless Indices Report*, at 209-210.

[551] *CTIA Year-End 2009 Wireless Indices Report*, at 211-212.

Chart 21
Six-Month Text Messaging Traffic Volumes[552]

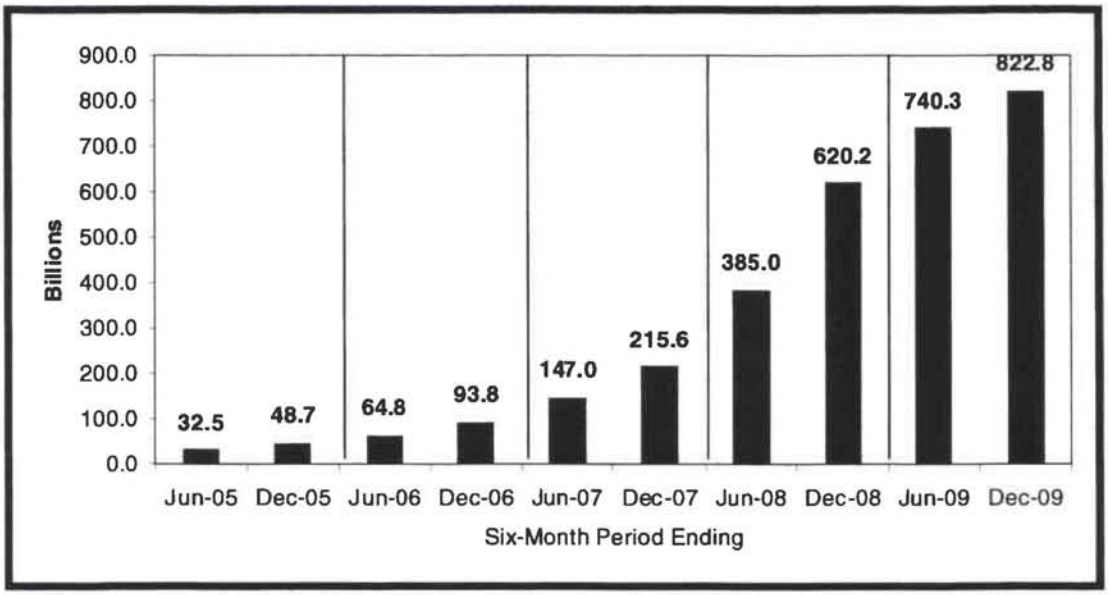
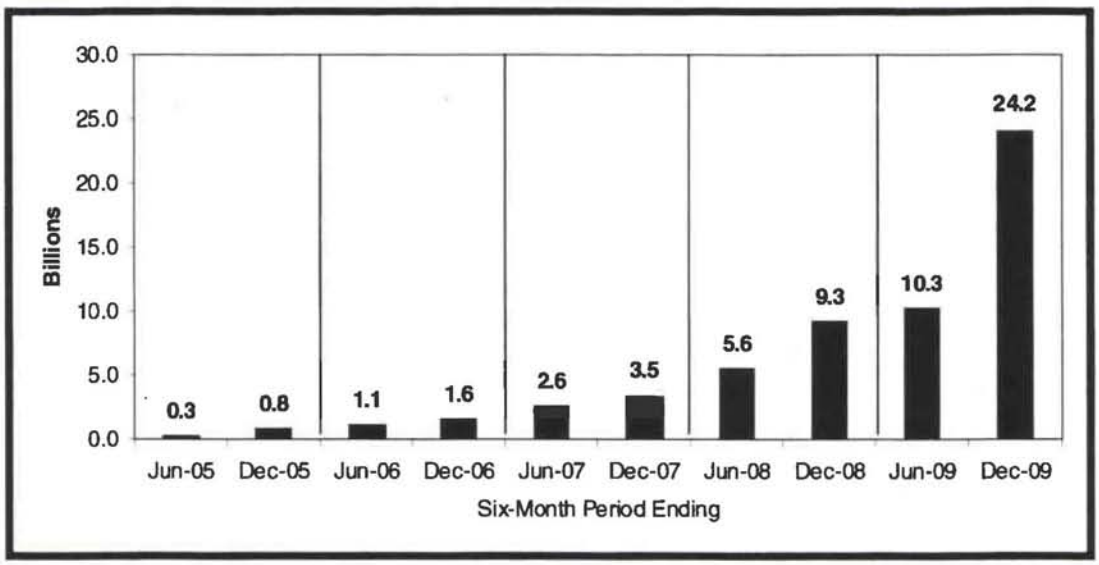


Chart 22
Six-Month MMS Traffic Volumes[553]



183. We can estimate the number of text and MMS messages per subscriber per month by dividing the total number of messages by the average number of mobile wireless subscriber connections, while recognizing that not all mobile wireless subscribers use messaging services. As shown in Table 18, the average mobile wireless subscriber sent 488 text messages and 14.4 MMS messages per month during the second half of 2009. This represents a 26 percent increase in the average number of text messages per subscriber per month from the second half of 2008, and a 148 percent increase in the average number of

[552] *CTIA Year-End 2009 Wireless Indices Report*, at 209-210.

[553] *CTIA Year-End 2009 Wireless Indices Report*, at 211-212.

MMS messages per subscriber per month during the same period. While the growth rate in MMS usage per subscriber remained similar to its 2008 level of 152 percent, the growth rate in text messaging usage slowed significantly from its 2008 level of 169 percent.

Table 18
Average Text and MMS Messages Per Subscriber Per Month[554]

Six-Month Period Ending	Average Text Messages Per User Per Month	Average MMS Messages Per User Per Month
Jun-05	29	0.3
Dec-05	40	0.7
Jun-06	51	0.9
Dec-06	69	1.2
Jun-07	103	1.8
Dec-07	144	2.3
Jun-08	248	3.6
Dec-08	388	5.8
Jun-09	451	6.3
Dec-09	488	14.4

184. As discussed in the *Fourteenth Report*, a major driver of growth in mobile messaging has been intensive use among the teen segment. According to a January 2010 study by Nielsen Media, teenagers send an average of 3,146 messages per month, which is the equivalent of more than ten messages every hour that they are not sleeping or in school. In the under-12 age group, Nielsen estimates that children are sending an average of 1,146 messages per month.[555] Users of social media and networking sites such as Twitter and Facebook are also creating text messaging traffic, as such users can be alerted via text message every time a tweet, message, or update earmarked for them is posted.[556] According to AT&T, 400 million texts generated by social networking sites were sent over its network in October 2009, and by September 2010, the number had more than doubled to one billion.[557]

3. Mobile Data Traffic (Non-Messaging)

185. As the mobile wireless industry migrates from a voice-centric to a data-centric service, data on data traffic are becoming increasingly important. Unlike voice and text messaging services, CTIA did not provide 2009 data on non-messaging mobile data traffic, though it did begin reporting data on mobile data traffic in 2010.[558] In October 2010, CTIA reported that mobile wireless service providers handled 161.5 billion MB of data during the first half of 2010, up 49.8 percent from the second half of

[554] *CTIA Year-End 2009 Wireless Indices Report*; Commission estimates.

[555] Roger Entner, *Under-aged Texting: Usage and Actual Cost*, Nielsen Wire, Jan. 27, 2010, *available at* http://blog.nielsen.com/nielsenwire/online_mobile/under-aged-texting-usage-and-actual-cost/.

[556] *See* Katherine Rosman, *Y U Luv Texts, H8 Calls*, The Wall Street Journal, Oct. 14, 2010.

[557] *Id.*

[558] *CTIA Year-End 2009 Wireless Indices Report*; Craig Moffett, *et al.*, *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, Bernstein Research, June 14, 2010, at 12. In addition, U.S. mobile wireless service providers typically do not release precise statistics on the data traffic on their networks.

2009.[559]

186. Other sources also indicate that mobile data traffic is growing significantly.[560] For instance, Cisco estimates that total mobile data traffic in North America grew by two and a half times from 6,282 terabytes (TB) per month in 2008 to 16,022 TB per month in 2009.[561] Based on the Cisco estimates, one analyst claimed that total mobile wireless traffic was evenly split between voice and data as of June 2010.[562] This analyst also estimated that average monthly data traffic per subscriber grew 78 percent from 138 MB in 2008 to 245.4 MB in 2009.[563] According to a report by Allot Communications, global mobile data bandwidth usage increased 72 percent during the second half of 2009.[564] Data traffic is increasing with: (1) the growth in smartphone subscribers; (2) the growing use of data-only mobile devices, such as laptop cards, e-readers, and tablets; and (3) the increased popularity of higher-bandwidth mobile applications.[565] Allot Communications reported that web browsing continued to generate the largest amount of mobile data traffic (33 percent) during the second half of 2009, followed by HTTP streaming video (27 percent), web downloads (21 percent), peer-to-peer messaging (12 percent), and other applications (7 percent).[566] HTTP streaming video was the fastest growing application during the second half of 2009, with the use of that application nearly doubling and YouTube consuming 10 percent of global mobile data bandwidth during that period.[567]

187. Several sources provide estimates of mobile data usage by type of device. One analyst has estimated that iPhone users consume 250-350 MB per month, five to seven times the monthly bandwidth of an average mobile voice subscriber and twice the amount of an average 3G smartphone user.[568] In addition, 59 percent of laptop/aircard users transferred over 500 MB of data traffic per month.[569] As a point of comparison, Bank of America/Merrill Lynch estimated that, in leading mobile broadband markets around the world, per-capita mobile data usage was around 100 MB per month as of

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[559] *CTIA-The Wireless Association Releases Semi-Annual Survey on Wireless Trends*, Press Release, CTIA, Oct. 6, 2010, *available at* http://www.ctia.org/media/press/body.cfm/prid/2021.

[560] *See Fourteenth Report*, 25 FCC Rcd at 11526-27, ¶ 181; *Torch Passes from Voice to Data.*

[561] Craig Moffett, *et al.*, *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, Bernstein Research, June 14, 2010, at 12 (*U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood).*

[562] *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 12.

[563] *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 13.

[564] Allot Communications, *Allot MobileTrends - Global Mobile Broadband Traffic Report*, H2/2009, at 3, *available at* http://www.allot.com/mobiletrends.html. (*Allot MobileTrends - Global Mobile Broadband Traffic Report).*

[565] Simon Flannery, *et al.*, *3Q Trend Tracker – Signs of Life for Telecom*, Morgan Stanley, Morgan Stanley Research – North America, Dec. 4, 2009, at 59. *See* Section VII.B.2, Mobile Applications, *infra.*

[566] *Allot MobileTrends - Global Mobile Broadband Traffic Report*, H2/2009, at 9.

[567] *Allot MobileTrends - Global Mobile Broadband Traffic Report*, H2/2009, at 4, 7.

[568] *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 6, 17. *See also Fourteenth Report*, 25 FCC Rcd at 11527, ¶ 182, for estimates of mobile data usage by device from Validas.

[569] *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 6, 17. *See also Fourteenth Report*, 25 FCC Rcd at 11527, ¶ 182, for estimates of mobile data usage by device from Validas.

December 2009.[570] In addition, according to Informa, 86 percent of mobile data traffic in North America is generated by smartphone users, notably those using an iPhone or "high-end" Android devices.[571]

188. Estimates of mobile traffic on the networks of individual mobile wireless service providers also indicate consumers are generating increasing amounts of mobile data traffic. In its 2010 Annual Report, AT&T reported that the annual data traffic on its network increased from 8.7 million MB in 2008 to 40.5 million MB in 2009 to 110.3 million MB in 2010.[572] In addition, the average mobile data user on Clearwire's network consumes an estimated 7 GB per month.[573]

D. Pricing Levels, Changes, and Trends

1. Price Indicators

189. Wide variations in the non-price terms and features of mobile wireless service plans make it difficult to characterize the price of mobile wireless service. Consequently, it is difficult to identify sources of information that track mobile wireless service prices in a comprehensive manner.[574] As documented in previous reports, mobile wireless prices have declined significantly since the launch of PCS service in the mid-1990s. Two indicators of mobile wireless service pricing – the Cellular CPI and per-unit price of voice service – show that price levels remained generally flat between 2008 and 2009.[575] As mentioned above, it is no longer possible to calculate unit prices for text messaging because CTIA discontinued reporting a breakout of text messaging revenue from overall mobile wireless data revenue. In addition, it is not possible to calculate unit prices for non-messaging mobile data services because the industry did not report 2009 mobile data traffic and non-messaging data revenue figures.[576]

190. *Cellular CPI.* One source of price information is the cellular telephone services' component of the CPI (Cellular CPI) produced by the U.S. Department of Labor's Bureau of Labor Statistics (BLS).[577] Cellular CPI data are published on a national basis only.[578] As shown in Table 19

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[570] *See Finding Value in Smartphones*, at 28.

[571] *See Smartphones Account for Almost 65% of Mobile Traffic Worldwide*, Press Release, Informa Telecoms & Media, Nov. 2, 2010 (quoting principal analyst, Malik Kamal-Saadi).

[572] AT&T, 2010 Annual Report, at 28, *available at* http://www.att.com/Common/about_us/annual_report/pdfs/ATT2010_Full.pdf. AT&T also reported that its mobile data traffic increased 50-fold between October 2006 and October 2009. *See Fourteenth Report*, 25 FCC Rcd at 11528, ¶ 183. Other sources report that the total traffic on its mobile wireless network doubled during the second half of 2009. *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 6

[573] *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 7.

[574] *See Fourth Report*, 14 FCC Rcd at 10164-10165.

[575] Only indicators of the price of mobile wireless *services* are discussed in this section. *See* Section VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*, for information on handset and device pricing.

[576] *See Fourteenth Report*, 25 FCC Rcd at 11529, 11533, ¶¶ 185, 193.

[577] *See* Table 19, *infra*. The CPI is a measure of the average change over time in the prices paid by urban consumers for a fixed market basket of consumer goods and services. The basket of goods includes over 200 categories including items such as food and beverages, housing, apparel, transportation, medical care, recreation, education, and communications. The CPI allows consumers to compare the price of the basket of goods and services this month with the price of the same basket a month or a year ago. Starting in December 1997, the basket included a category for cellular/wireless telephone services. All CPI figures discussed above were taken from BLS databases found at http://www.bls.gov. The index used in this analysis, the CPI for All Urban Consumers (CPI-U), represents about 87 percent of the total U.S. population. *See* Bureau of Labor Statistics, *Consumer Price Index: Frequently Asked Questions*, http://www.bls.gov/cpi/cpifaq.htm (visited Nov. 12, 2010). While the CPI-U is urban-oriented, it does include expenditure patterns of some of the rural population. *See Fourteenth Report*, 25 FCC Rcd at 11529, n. 561. Information submitted by companies for the CPI is provided on a voluntary basis. *Id.*

below, from 2008 to 2009, the annual Cellular CPI remained unchanged while the overall CPI decreased by 0.4 percent. From December 1997, the Cellular CPI has declined 35.8 percent compared to the annual index.

Table 19
Change in CPI[579]

	CPI		Cellular CPI		All Telephone CPI		Local Telephone CPI		Long Distance Telephone CPI	
		Annual Change	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change
Dec 1997	100		100		100		100		100	
1998	101.6		95.1		100.7		101.6		100.5	
1999	103.8	2.2%	84.9	-10.7%	100.1	-0.6%	103.4	1.8%	98.2	-2.3%
2000	107.3	3.4%	76.0	-10.5%	98.5	-1.6%	107.7	4.1%	91.8	-6.5%
2001	110.3	2.8%	68.1	-10.4%	99.3	0.8%	113.3	5.2%	88.8	-3.3%
2002	112.1	1.6%	67.4	-1.0%	99.7	0.4%	118.5	4.5%	84.9	-4.4%
2003	114.6	2.3%	66.8	-0.9%	98.3	-1.4%	123.3	4.1%	77.8	-8.4%
2004	117.7	2.7%	66.2	-0.9%	95.8	-2.5%	125.1	1.5%	70.9	-8.9%
2005	121.7	3.4%	65.0	-1.8%	94.9	-0.9%	128.5	2.7%	67.5	-4.8%
2006	125.6	3.2%	64.6	-0.6%	95.8	0.9%	131.1	2.1%	68.3	1.2%
2007	129.2	2.8%	64.4	-0.3%	98.247	2.6%	136.2	3.8%	71.453	4.6%
2008	134.1	3.8%	64.2	-0.2%	100.451	2.2%	141.0	3.6%	74.846	4.7%
2009	133.7	-0.4%	64.2	0.0%	102.39	1.9%	145.0	2.8%	78.099	4.3%
Dec 1997 to 2009		33.7%		-35.8%		2.4%		45.0%		-21.9%

191. *Revenue per Voice Minute.* In addition to the Cellular CPI, some analysts believe Voice RPM is a good proxy for mobile voice pricing.[580] This metric is calculated by dividing an estimate of average monthly revenue per subscriber (often referred to as average revenue per unit, or "ARPU") for voice services by average monthly minutes of use for the equivalent period.[581] Using estimates of industry-wide voice ARPU[582] and MOUs from CTIA, as shown in Table 20, we estimate that Voice RPM in December of 2009, rounded to the nearest cent, remained at $0.05 for the third straight year. The

(Continued from previous page)

[578] *Id.* The Cellular CPI includes charges from all telephone companies that supply "cellular telephone services," which are defined as "domestic personal consumer phone services where the telephone instrument is portable and it sends/receives signals for calls by wireless transmission." This measure does not include business calls, telephone equipment rentals, portable radios, and pagers. *Id.*

[579] Bureau of Labor Statistics. All CPI figures were taken from BLS databases found on the BLS Internet site available at http://www.bls.gov. Beginning in January 2010, the CPIs for local telephone service and long-distance telephone service will be discontinued, and a new CPI for land-line telephone services will be published.

[580] *See US Wireless Matrix 1Q07*, at 52.

[581] To generate Voice RPM, we subtracted wireless data revenues, derived from CTIA's survey, from ALMB (we assumed this was the same percentage of wireless data revenues in CTIA's measure of total service revenues), then we divided that number by CTIA's average MOUs per month. *See also Twelfth Report*, 23 FCC Rcd at 2323-24, ¶ 200. The average monthly minutes of use figure reflects voice minutes *used* and captured as network traffic, rather than minutes *paid for* as part of a monthly service package.

[582] Note that this version of ARPU is CTIA's "Average Local Monthly Bill" ("ALMB"), which does not include toll or roaming revenues where they are not priced into a calling plan. *See infra* note 605.

absolute, unrounded estimate of Voice RPM in December of 2009 decreased nine percent from its absolute value in December of 2008.[583] While voice RPM has declined dramatically over the past 17 years, the rate of per-minute price declines has been varied considerably from year to year, and has decreased in recent years, as shown in Chart 23.

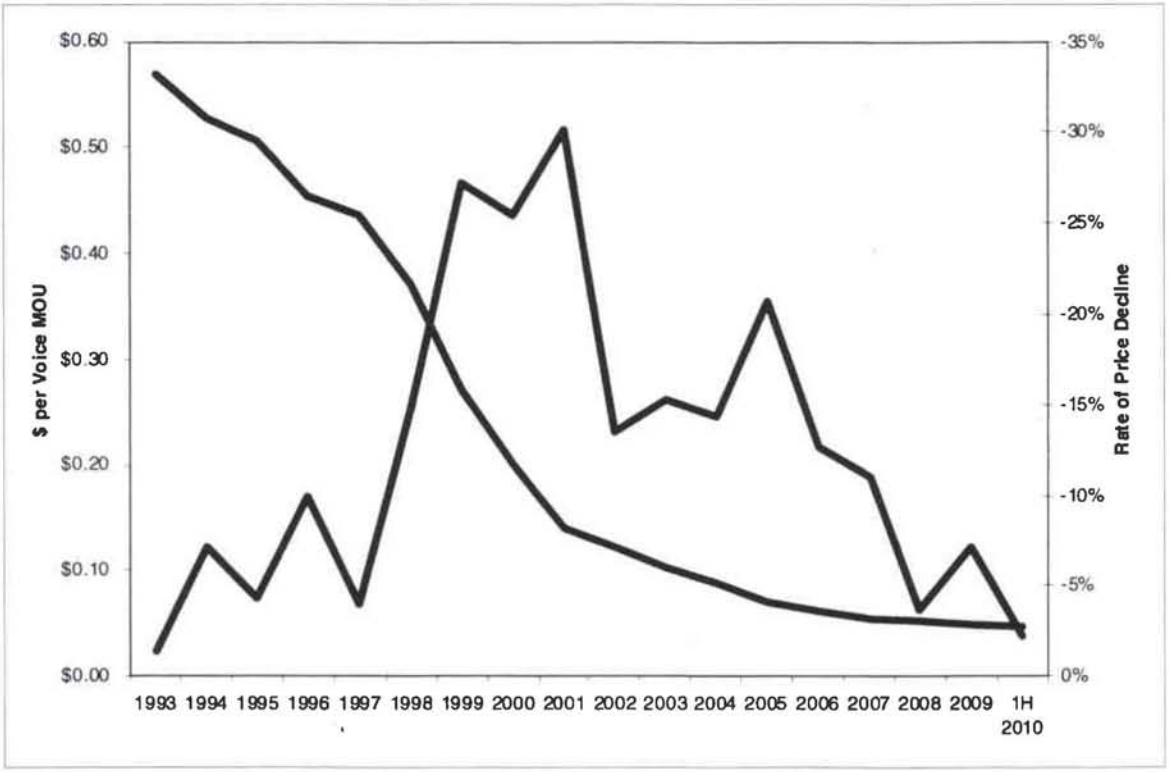
Table 20
Average Revenue Per Minute[584]

	Average Local Monthly Bill	Minutes of Use Per Month	Average Revenue Per Minute (Blended)	Annual Change in Blended RPM	Wireless Data Revenue as Percent of Total Service Revenues	Average Local Monthly Bill (excl. Data Revenues)	Average Revenue Per Voice Minute	Annual Change in Absolute Voice RPM
1993	$61.49	140	$0.44		n/a	$61.49	$0.439	
1994	$56.21	119	$0.47	8%	n/a	$56.21	$0.472	8%
1995	$51.00	119	$0.43	-9%	n/a	$51.00	$0.429	-9%
1996	$47.70	125	$0.38	-11%	n/a	$47.70	$0.382	-11%
1997	$42.78	117	$0.37	-4%	n/a	$42.78	$0.366	-4%
1998	$39.43	136	$0.29	-21%	n/a	$39.43	$0.290	-21%
1999	$41.24	185	$0.22	-23%	0.2%	$41.16	$0.222	-23%
2000	$45.27	255	$0.18	-20%	0.4%	$45.09	$0.177	-21%
2001	$47.37	380	$0.12	-30%	0.9%	$46.94	$0.124	-30%
2002	$48.40	427	$0.11	-9%	1.2%	$47.82	$0.112	-9%
2003	$49.91	507	$0.10	-13%	2.5%	$48.66	$0.096	-14%
2004	$50.64	584	$0.09	-12%	4.8%	$48.21	$0.083	-14%
2005	$49.98	708	$0.07	-19%	8.3%	$45.83	$0.065	-22%
2006	$50.56	714	$0.07	0%	13.5%	$43.73	$0.061	-5%
2007	$49.79	769	$0.06	-9%	17.9%	$40.88	$0.053	-13%
2008	$50.07	708	$0.07	9%	23.3%	$38.40	$0.054	2%
2009	$48.16	696	$0.07	-2%	28.7%	$34.34	$0.049	-9%

[583] *See* Table 20, *infra*. Previous reports also included an estimate of Total or Blended RPM, which is calculated by dividing total ARPU by MOUs. However, as the contribution of data services to total revenues has increased, Blended RPM has become an increasingly inaccurate measure of the pricing of mobile voice service. Previously, revenues from mobile data services were a relatively insignificant portion of the average wireless subscriber's bill, and Blended RPM and Voice RPM were mostly identical. However, as data has become an ever increasing portion of subscriber bills, the two metrics have diverged, with the decline in Voice RPM becoming steeper, and its absolute value becoming lower, than Blended RPM. *See Fourteenth Report*, 25 FCC Rcd at 11531, ¶ 189; AT&T Comments at 30-31. Therefore, we are no longer including a discussion of Blended RPM in this *Report*.

[584] *CTIA Year-End 2009 Wireless Indices Report*, at 121, 200. *See* Appendix C, Table C-1 (ARPU). Data covers the last six months of each year. For purposes of this presentation in this table, RPM is rounded to two decimal places, but RPM change is based on absolute RPM.

Chart 23
Mobile Wireless Voice Revenue per Minute: 1993-2010



192. *Revenue per Text Message.* In previous *Reports*, we derived a proxy for the pricing of text messages based on CTIA data by dividing an estimate of text messaging revenues by an estimate of the number of text messages sent during a specified period.[585] The results showed that the average price for text messages steadily declined from between three and four cents per message in 2005 to approximately one cent per message in 2008. In 2009, however, the industry stopped reporting a breakout of text messaging revenues from overall wireless data service revenues. As a consequence, it is no longer possible to calculate unit prices for text messaging based on industry data collected by CTIA, and therefore we discontinue reporting this particular pricing indicator in this *Report*.

193. Although we are no longer able to derive an estimate of average revenue per text message based on CTIA data, an alternative estimate from Morgan Stanley suggests that the unit price for text messages continued to fall in 2009. Morgan Stanley estimated that price per text yields dropped for the fifth consecutive year in 2009 to $0.009, a 25 percent decline from the previous year.[586] Morgan Stanley attributes this continued decline to increased adoption of texting bundle plans.[587]

[585] *See Fourteenth Report*, 25 FCC Rcd at 11532, ¶¶ 191-192.

[586] *Torch Passes from Voice to Data*, at 5, 21.

[587] *Id.* (stating that "the carriers have been slowly pushing subscribers towards bundle plans by raising à la carte texting in stages from $0.10 to now $0.20").

Table 21
Average Revenue Per Text Message[588]

Year	Text Traffic Volume	Average Messages Per User Per Year	Text Messaging Revenues	Average Revenue Per Text Message
2005	81,208,225,767	476	$2,991,666,181	$0.037
2006	158,648,546,798	779	$5,672,984,205	$0.036
2007	362,549,531,172	1,572	$8,976,574,961	$0.025
2008	1,005,144,143,136	4,183	$11,355,095,991	$0.011
2009	1,563,090,908,850	5,634	NA	NA

194. *Broadband Price Unit Metrics*. As noted above, it is not possible to calculate unit prices for non-messaging mobile data services (price per MB) because CTIA's industry data for 2009 did not include mobile data traffic and non-messaging data revenue figures.[589] However, Bernstein estimates that the typical price-per-MB for unlimited data plans on smartphones ranges from $0.02 to $0.15, and the typical price-per-MB for data plans for laptops and wireless data cards ranges from $0.01 to $0.08.[590] In addition, AT&T's estimated price per MB for data traffic – calculated by dividing AT&T's reported annual wireless data revenue by its reported mobile broadband traffic – has declined from $1.21 in 2008 to $0.35 in 2009 to $0.17 in 2010.[591]

2. Wholesale Pricing

195. Resellers and MVNOs purchase minutes at wholesale prices from facilities-based mobile service providers. Contractual agreements between mobile network operators and resellers or MVNOs for wholesale prices differ among MVNOs because they depend upon the rates that each MVNO negotiates with facilities-based providers. These negotiated rates are generally not publicly available, so it is difficult to track wholesale pricing in the mobile wireless sector in a comprehensive manner.

196. As noted in the *Fourteenth Report*, one analyst has estimated the pricing for Sprint Nextel's wholesale deal with Virgin Mobile USA prior to Sprint Nextel's acquisition of Virgin Mobile.[592] According to this analyst, Virgin Mobile paid Sprint Nextel approximately $0.02 per minute on average.[593] The analyst stated that the pricing was almost all variable, and Sprint Nextel's price structure was based on a tiered system in which Virgin Mobile paid a certain per-minute rate for the first level of MOUs and then a lower per-minute rate for the next tiered level of usage, with the rate dropping for only the incremental minutes at the next tier level rather than for all the minutes used. Based on Virgin Mobile's retail pricing structure, the analyst estimated that Sprint Nextel received about 25 percent of the revenues generated by an average Virgin Mobile customer.[594]

3. Intercarrier Roaming Rates and Revenue

197. Intercarrier roaming rates are set by contractual agreements that are confidential, and

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[588] *CTIA Year-End 2009 Wireless Indices Report*, at 115, 198-200; Commission estimates.

[589] *See* Section V.C, Output and Usage Levels, *supra*. *See also Fourteenth Report*, 25 FCC Rcd at 11529, 11533, ¶¶ 185, 193.

[590] *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, at 17.

[591] AT&T, 2010 Annual Report, at 28, *available at* http://www.att.com/Common/about_us/annual_report/pdfs/ATT2010_Full.pdf. *See* Section V.C.3, Mobile Data Traffic (Non-Messaging), *supra*.

[592] *See Fourteenth Report*, 25 FCC Rcd at 11533, ¶ 195.

[593] *Slumdog Millionaires*, at 22.

[594] *Id.* at 24.

particular rates vary across agreements depending on the terms negotiated by service providers. However, as discussed below, CTIA data on roaming revenues and roaming minutes of use (MOUs) can be used to derive a metric for average roaming revenue per minute. CTIA reports "outcollect" roaming revenues, which are the revenues generated by roamers inside the providers' home coverage areas.[595] Outcollect roaming revenues for the entire mobile wireless industry decreased to $3.061 billion in 2009 from $3.739 billion in 2008.[596] We note that CTIA's roaming revenue data do not distinguish between voice and data revenues. Since total service revenues have continued to grow each year, the contribution of roaming revenues to total service revenues has continued to decline steadily: from 3.3 percent in 2005 to 2.8 percent in 2006, 2.7 percent in 2007, 2.5 percent in 2008, and 2.3 percent in 2009, which is down from over ten percent in 1999.[597]

198. In addition, reported annual roaming voice MOU traffic declined slightly to 121.1 billion MOUs in 2009 from 121.4 billion MOUs in 2008. Over a ten-year period, voice roaming traffic has grown significantly, from 13 billion in 1999 to 121.1 billion in 2009. However, this growth was much slower than overall voice traffic growth, which increased from 147.7 billion minutes to 2.3 trillion minutes during the same period. Therefore, roaming voice traffic as a percentage of overall voice traffic has decreased from 8.8 percent in 1999 to 5.5 percent in 2008 and to 5.3 percent in 2009, a nearly 40 percent relative decline.[598]

199. As we have in past *Reports*, we derive an average *roaming* RPM by dividing reported annual roaming revenues by reported annual roaming MOUs. This aggregate proxy for intercarrier roaming rates is likely to be somewhat overstated because the roaming revenue figure includes revenue from both voice and data services, while the roaming MOU figure includes only voice roaming services.[599] Without separate data for voice and data roaming revenue and traffic, we do not know the degree to which this estimate of average roaming RPM is overstated. As reported in Table 22 below, average roaming RPM has declined from just over 30 cents per minute in 1999 to less than three cents per minute in 2009, and has been generally flat for the past five years.

[595] Robert F. Roche and Lesley O'Neill, *CTIA's Wireless Industry Indices, Semi-Annual Data Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry, Year-End 2008 Results*, May 2009, at 92-99 (*CTIA Year-End 2008 Wireless Indices Report*).

[596] *See* Table C-1, Appendix C, *infra*.

[597] *Id.* This is for the entire 12-month period.

[598] *CTIA Year-End 2009 Wireless Indices Report*, at 197-198.

[599] As noted above, actual intercarrier roaming rates are set by contractual agreements among providers and are confidential.

Table 22
Roaming Revenues and Rates[600]

	Outcollect Roaming Revenues (in $000s)	Percent Change	Percent of Total Service Revenues	Voice Roaming MOUs	Percent of Total MOUs	Average Roaming Revenue Per Minute (Blended)
1999	$4,085,417	16.71%	10.2%	13,038,555,635	8.8%	$0.31
2000	$3,882,981	-4.96%	7.4%	20,852,266,390	8.1%	$0.19
2001	$3,752,826	-3.35%	5.7%	27,811,907,410	6.1%	$0.13
2002	$3,895,511	3.80%	5.1%	43,846,470,833	7.1%	$0.09
2003	$3,766,267	-3.32%	4.3%	56,828,973,359	6.8%	$0.07
2004	$4,210,330	11.79%	4.1%	71,440,711,110	6.5%	$0.06
2005	$3,786,332	-10.07%	3.3%	115,008,338,841	7.7%	$0.03
2006	$3,494,294	-7.71%	2.8%	91,991,570,460	5.1%	$0.04
2007	$3,742,015	7.09%	2.7%	107,615,715,912	5.1%	$0.03
2008	$3,739,274	-0.07%	2.5%	121,438,208,469	5.5%	$0.03
2009	$3,061,344	-18.1%	2.3%	121,092,013,905	5.3%	$0.025

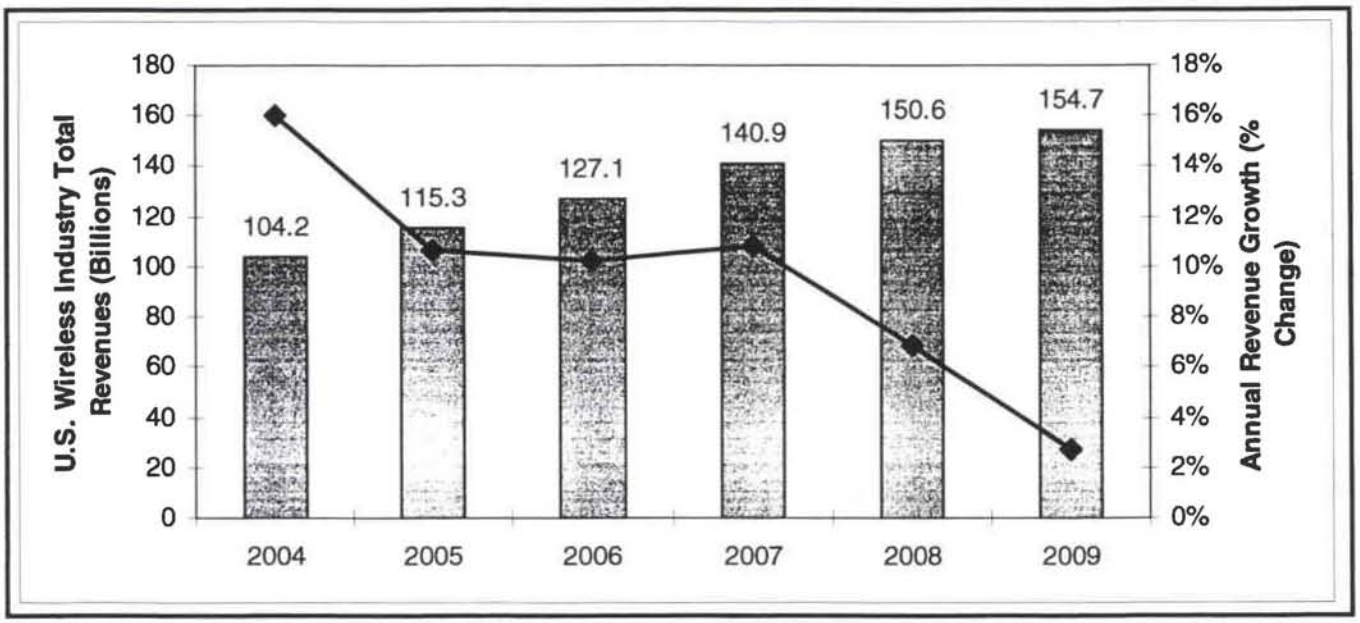
E. Revenue and ARPU

200. Service revenues for the U.S. mobile wireless industry have increased each year between 2004 and 2009, although the annual growth rate for revenues has been in decline since 2007 (see Chart 24). According to CTIA estimates, mobile wireless service providers generated approximately $154.7 billion in service revenues in 2009, up three percent from $150.6 billion in 2008. In March 2011, CTIA announced that service revenues for 2010 totaled $159.9 billion.[601]

[600] *CTIA Year-End 2009 Wireless Indices Report.*

[601] CTIA, *Year-End 2010 Top Line Survey Results*, http://files.ctia.org/pdf/CTIA_Survey_Year_End_2010_Graphics.pdf (visited Mar. 31, 2011).

Chart 24
Wireless Industry Service Revenues[602]

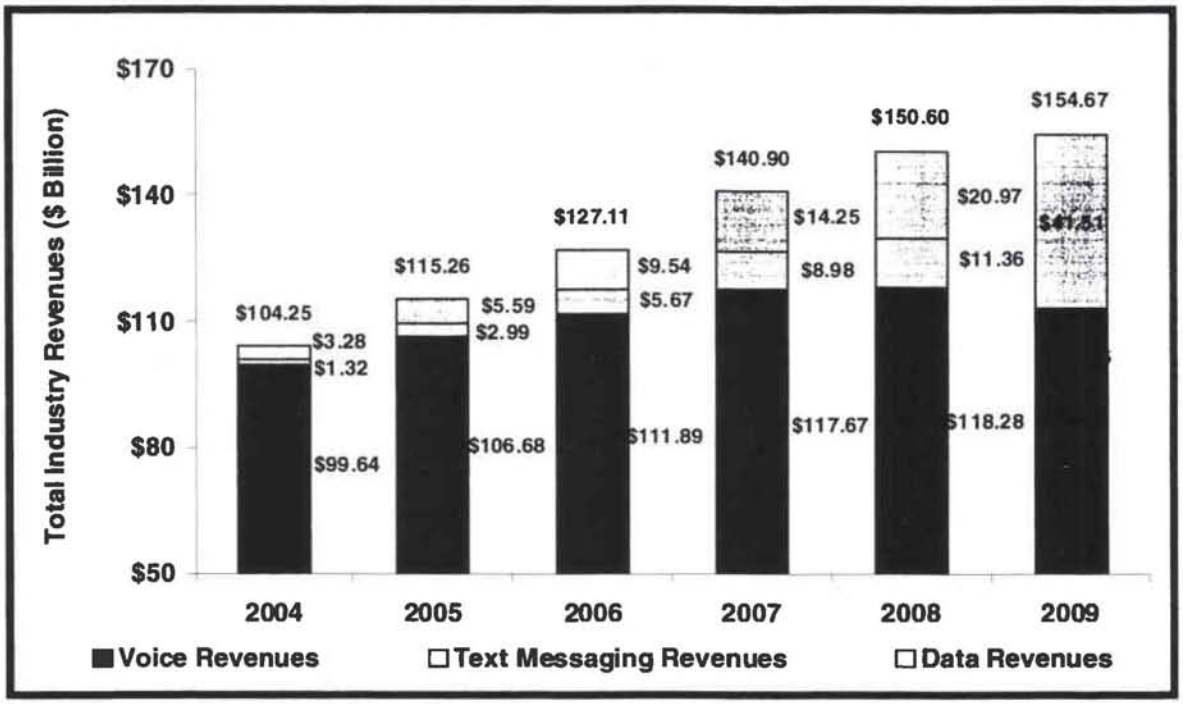


201. CTIA divides mobile wireless service revenues into two categories: voice and data. As shown in Chart 25, annual voice revenues declined for the first time in 2009, by approximately four percent, from $118 billion to $113 billion. At the same time, data revenue increased 28 percent from $32 billion to $42 billion. In 2009, CTIA discontinued the practice of reporting a breakout data series for text messaging and other mobile data service revenues.[603]

[602] *CTIA Year-End 2009 Wireless Indices Report.*

[603] In previous years, CTIA broke service revenues into three categories: voice, messaging, and data. In 2009, CTIA eliminated the messaging category, and messaging and other data services are now combined in the data services category.

Chart 25
Total Mobile Wireless Industry Revenues[604]



202. ARPU is a financial metric widely used in analyzing the mobile wireless industry, and is calculated by dividing CTIA's revenue estimate by its estimate of total subscriber connections. One estimate of ARPU reported by CTIA, average local monthly bill (ALMB),[605] has fluctuated around the $50 level since 2003, and closed 2009 at $48.16, down four percent from the end of 2008. As seen in Table 20, declining industry-wide voice ARPU (as measured by ALMB excluding data revenues) continued to be offset by growth in data ARPU. According to CTIA's ALMB estimates, data revenues accounted for 28.7 percent of total service revenues in the second half of 2009, compared to 23.2 percent a year earlier.

203. An alternate measure of ARPU, which is based on CTIA's total service revenues figure (including roaming and toll revenues), shows that data ARPU has risen steadily since 2004, while voice ARPU has steadily declined (see Chart 26). After remaining unchanged in 2008, total service ARPU declined nearly three percent in 2009 from $47.09 to $45.85. In 2009, total service revenue was broken into voice service and data service revenue, and voice ARPU declined nine percent from $36.98 to $33.54. Wireless data service ARPU rose 22 percent from $10.11 in 2008 to $12.30 in 2009, and accounted for 27 percent of ARPU in 2009.[606]

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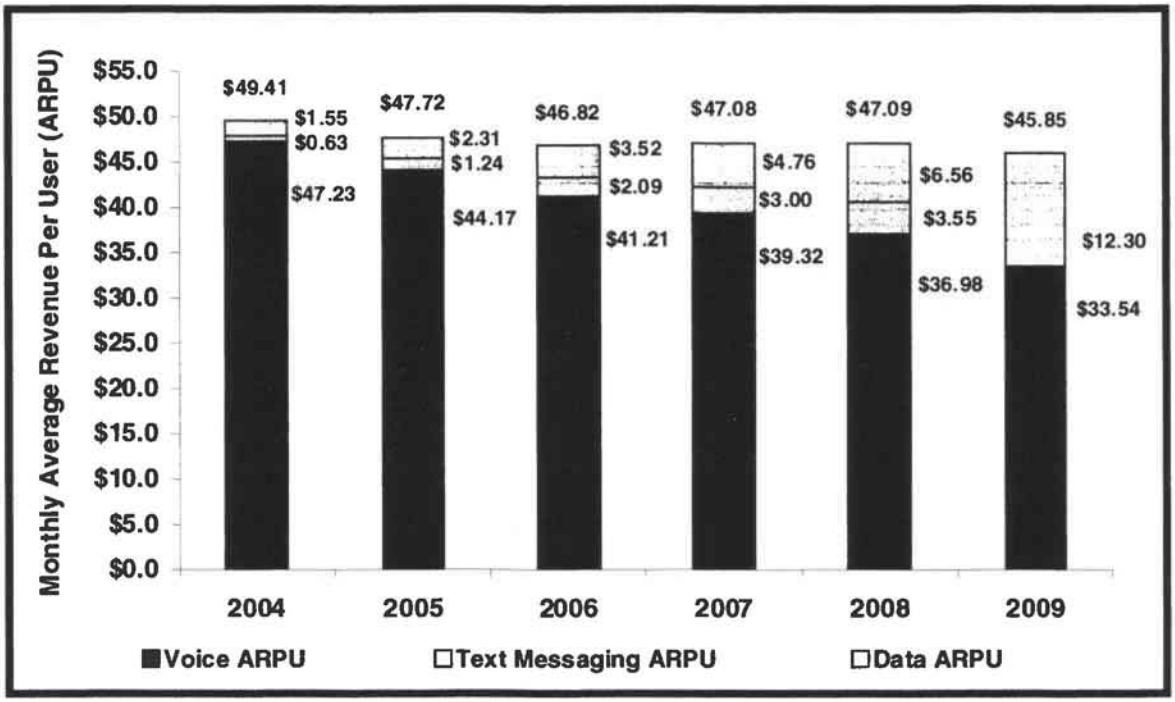
[604] *CTIA Year-End 2009 Wireless Indices Report.*

[605] There are different ways of calculating ARPU. The measure used here and shown in Table 20 is CTIA's "average local monthly bill," which does not include toll or roaming revenues and "reflects strictly service-related revenues associated with services provided to customers in their home markets." *CTIA Year-End 2009 Wireless Indices Report*, at 183. CTIA provides alternative measures of ARPU, one of which includes roaming but excludes toll revenues, and another of which includes both roaming and toll revenues. These ARPU measures are derived by dividing total service revenue (either including or excluding toll) by the average number of subscribers for the period. For a comparison of the different ARPU measures, see *Id.*

[606] In 2008 and prior years, CTIA reported a breakout of data revenue into text messaging revenue and other data service revenue. Because CTIA discontinued this practice in 2009, it is no longer possible to derive an estimate of ARPU for text messaging services and non-messaging data services.

Chart 26
Monthly ARPU by Type of Service[607]



204. We believe the trends of declining voice ARPU and rising data ARPU are the result of several factors, including increases in mobile data usage and subscribership,[608] further declines in the absolute per-minute price of mobile voice calls, and an increase in the share of subscribers who typically spend less each month on mobile calls (*e.g.*, prepaid customers).[609]

205. The growth in data revenue as a percentage of total revenue for the individual four nationwide service providers is shown in Chart 27. While data revenues have been growing at all four providers, data accounts for a larger percentage of total revenue at Verizon Wireless and AT&T. In the fourth quarter of 2009, data revenue accounted for around 31 percent of Verizon Wireless's and AT&T's total revenue, as compared to 27 percent at Sprint Nextel and 22 percent at T-Mobile. According to one analyst, this difference reflects the increasing smartphone penetration at AT&T and Verizon Wireless.[610] In particular, AT&T claims that it has twice as many smartphones operating on its network than any of its competitors.[611]

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[607] *CTIA Year-End 2009 Wireless Indices Report*; Commission analysis. Total and voice ARPU include roaming and toll revenues. The ARPU calculations are based on CTIA's total estimated subscriber connection numbers, rather than its reported subscriber connection numbers. *See CTIA Year-End 2009 Wireless Indices Report*

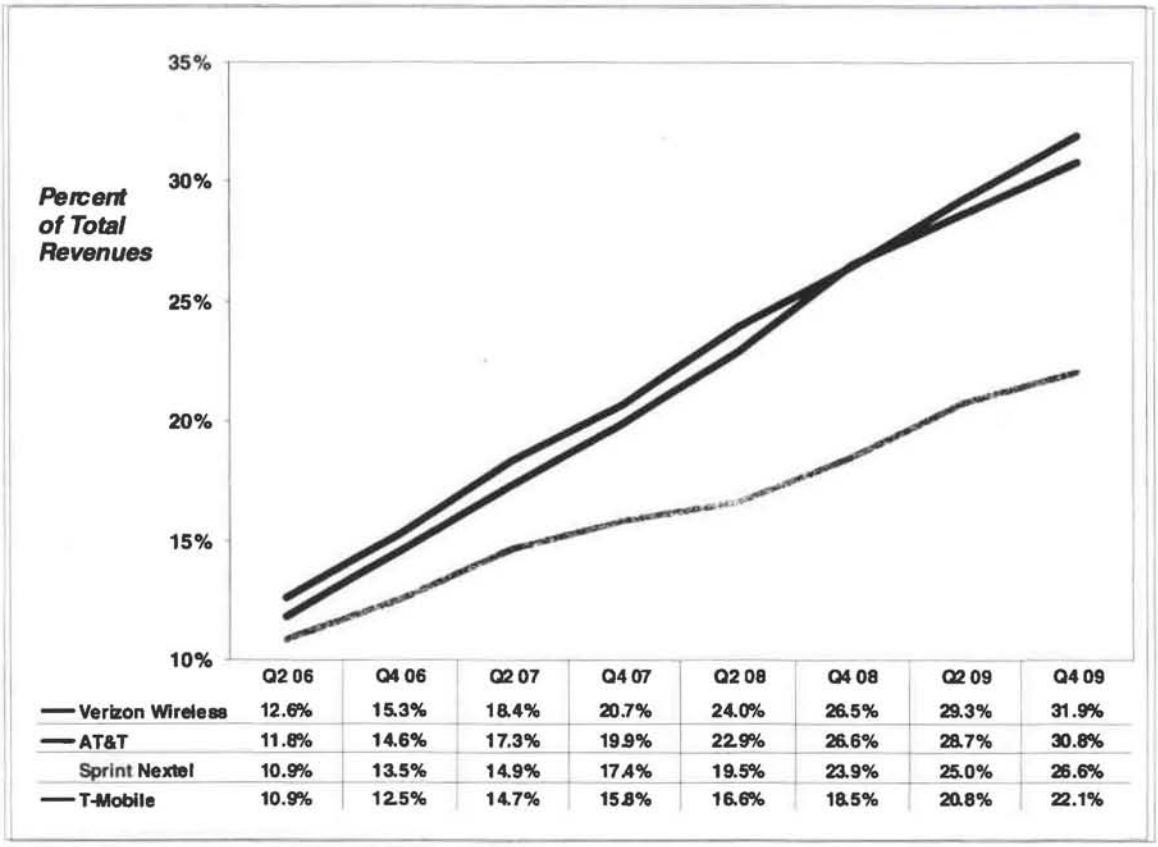
[608] *See* Sections V.A, Subscribership/Connection Levels and V.C, Output and Usage Levels, *supra.*

[609] *See, e.g.*, Simon Flannery *et al.*, *Deteriorating Wireless Trends, Revisited*, Morgan Stanley, Equity Research, Jan. 18, 2007, at 3 ("[a] growing portion of these net adds are coming from lower-ARPU family plans, prepaid customers, and others receiving larger buckets of minutes at lower per-minute prices").

[610] *Torch Passes from Voice to Data*, at 24.

[611] *Torch Passes from Voice to Data*, at 24.

Chart 27
Wireless Data Revenue as a Percentage of Total Revenue[612]



	Q2 06	Q4 06	Q2 07	Q4 07	Q2 08	Q4 08	Q2 09	Q4 09
Verizon Wireless	12.6%	15.3%	18.4%	20.7%	24.0%	26.5%	29.3%	31.9%
AT&T	11.8%	14.6%	17.3%	19.9%	22.9%	26.6%	28.7%	30.8%
Sprint Nextel	10.9%	13.5%	14.9%	17.4%	19.5%	23.9%	25.0%	26.6%
T-Mobile	10.9%	12.5%	14.7%	15.8%	16.6%	18.5%	20.8%	22.1%

F. Investment

206. Investment, as measured by capital expenditure, and also referred to as "capital spending" or "CAPEX," is funds spent during a particular period to acquire or improve long-term assets, such as property, plant, or equipment.[613] In the mobile wireless industry, CAPEX primarily consists of spending to upgrade and expand networks to increase data connection speeds, enable more reliable service, and improve coverage.[614]

207. Over the past decade, mobile wireless service providers have invested significantly in wireless network structures and equipment.[615] Between 1999 and 2009, industry-wide capital investment by wireless providers exceeded $213 billion.[616] We note that CAPEX by mobile service providers can be

[612] Data provided by Sanford Bernstein Research.

[613] *A Dictionary of Finance and Banking* (2nd ed.), Oxford University Press, 1997, at 50-51. There are differing opinions on what constitutes capital spending versus non-capital spending.

[614] AT&T, SEC Form 10-K, filed Feb. 25, 2009, at 8, 24; Sprint Nextel, SEC Form 10-K, filed Feb. 27, 2009, at 17.

[615] *See* Section IV.B.1, Network Coverage and Technology Upgrades, *supra.*

[616] *See CTIA Year-End 2009 Wireless Indices Report*, at 137, based on cumulative capital investment figures. CTIA derived the cumulative capital investment figures for 2005-2009 by summing the final 2004 cumulative capital investment figure with subsequently reported incremental capital investment. The industry-wide capital expenditures figure reported in the *Fourteenth Report* of $240 billion for 1998-2008 was based on data from the Census Bureau.

"lumpy," meaning that it can vary significantly from one year to the next for a specific provider.[617] According to AT&T, providers may spend significant amounts to upgrade their networks in one year and then may focus on integrating their upgrades into their offerings and signing up new customers the following year.[618]

208. According to the U.S. Census Bureau, total wireless industry capital expenditures declined from $25.3 billion in 2008 (revised Census data) to $20.7 billion in 2009, a decline of approximately 18 percent. This amount accounted for 31 percent of overall capital expenditures in the telecommunications industry, 24 percent of information/communication sector capital expenditures, and two percent of total capital expenditures in the U.S. economy.[619] Data from CTIA, on the other hand, suggest that capital investment by mobile wireless service providers increased slightly in 2009, reversing the trend of declining investment in 2006 through 2008. CTIA reports that incremental capital investment by wireless operators totaled $20.4 billion in 2009,[620] a one percent increase from the $20.2 spent in 2008.[621]

Table 23
Annual Capital Expenditures by Wireless Service Providers[622]

	2004	2005	2006	2007	2008	2009
Census Bureau: Total Annual Capital Expenditures (in billions)	$24.0	$27.3	$27.9	$22.2	$25.3	$20.7
Census Bureau: Percent Change in Capital Expenditures from Previous Year	14.3%	13.8%	2.2%	(20.4%)	14.0%	(18.2%)
CTIA: Total Annual Incremental Capital Investment (in billions)	$14.1	$25.2	$24.4	$21.1	$20.2	$20.4
CTIA: Percent Change in Incremental Capital Investment from Previous Year	(12.0%)	78.8%	(3.2%)	(13.5%)	(4.3%)	1.0%

209. According to CTIA, while total incremental capital investment increased slightly in 2009, incremental investment per subscriber continued to decline in 2009, as shown in Chart 28. During 2009, capital investment per subscriber fell 4.5 percent to $73.24 from its 2008 level of $76.73. From 2005 to 2009, annual capital investment per subscriber fell 43 percent.

[617] AT&T Comments at 34.

[618] AT&T Comments at 34.

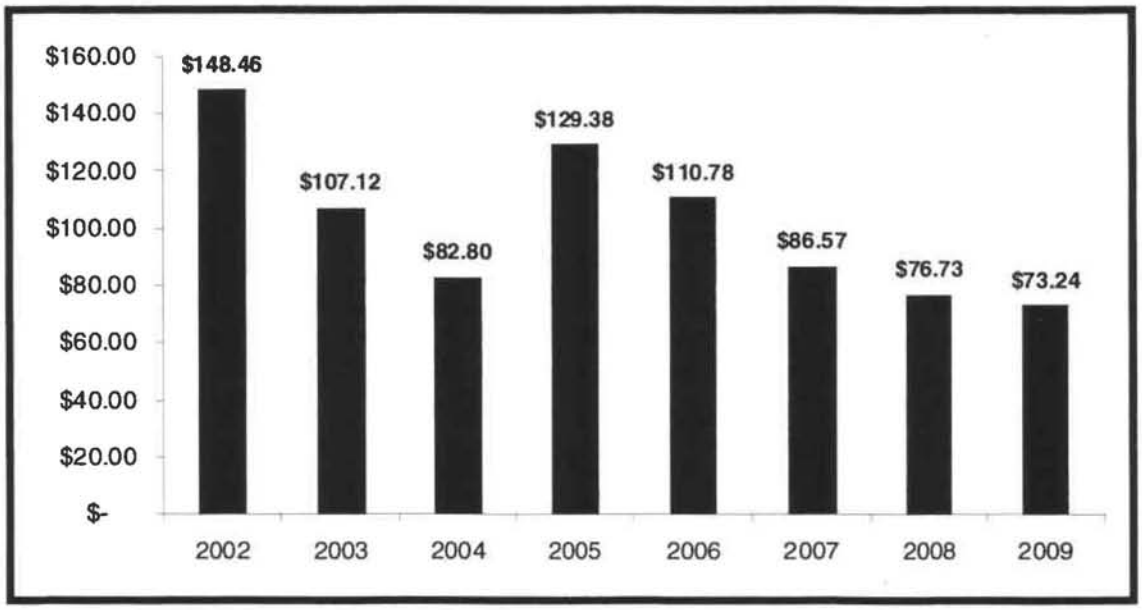
[619] *See* U.S. Census Bureau, Annual Capital Expenditures Survey, http://www.census.gov/econ/aces/index.html, visited Feb. 9, 2011.

[620] CTIA's figure includes incremental investment in currently operational systems, including expenditures for building operating systems, land and capital leases, and all tangible non-system capital investment, but does not include the cost of spectrum licenses purchased at auctions or other acquisition processes or greenfield builds. *CTIA Year-End 2009 Wireless Indices Report*, at 131; CTIA Comments at 66.

[621] *CTIA Year-End 2009 Wireless Indices Report*, at 133.

[622] U.S. Census Bureau, Service Annual Survey Data, 2007-2008; U.S. Census Bureau, Annual Capital Expenditures Surveys, 2004-2008; *CTIA Year-End 2009 Wireless Indices Report*.

Chart 28
Annual Incremental Capital Investment per Subscriber[623]



210. Based on data from both the Census Bureau and CTIA, we found that capital investment as a percentage of total industry revenue declined between 2005 and 2009 (see Chart 29). Data from CTIA show that investment as a percentage of revenue declined from 14 percent to 13 percent between 2008 and 2009, while Census Bureau data show that this metric remained flat at 14 percent over the same period.

[623] *CTIA Year-End 2009 Wireless Indices Report.*